

Report No. UT-05.10

Wildlife & Domestic Animal-Vehicle Collisions

Prepared For:

Utah Department of Transportation Research
and Development Division

Authored By:

Wildlife QIT

August 2005

DISCLAIMER

The Contents of this report reflect the view of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Utah Department of Transportation (UDOT).

UDOT RESEARCH & DEVELOPMENT REPORT ABSTRACT

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UTAH DEPARTMENT OF TRANSPORTATION

Wildlife QIT Toolkit

August 2005



Wildlife & Domestic Animal-Vehicle Collisions

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And most importantly, thanks to the many UDOT Maintenance personnel who reviewed the findings of the Wildlife QIT and provided additional information on a regular basis. Their continuing efforts in identifying and coordinating animal-vehicle collision locations will keep this a living document.

TABLE OF CONTENTS

Summary	1
Background Information	1
Data Collection	1
Domestic “Hot Spots” (Greater than 4 Accidents/Mile)	5
Wildlife Hits (Greater than 20 Accidents/Mile)	5
Functional Classification/Prioritization of State Routes	8
The Process	8
Planning	8
Early Project Examination/Identification	8
Early Environmental/Planning Coordination	9
Long Range Plan of Costly Projects	9
Statewide Transportation Improvement Plan	10
Project Development	10
Preconstruction	10
Construction	13
Maintenance	13
Mitigation Measures	14
National Mitigation Measures	14
Mitigation Measures in Utah	16
Mitigation Methods for Further Research	18
Policy & Standards	18
Communication/Coordination	19
Contacts	19
Funding Sources	22
Performance Measures	22
Appendix	23
Latest UDOT Research Study Findings	23
Lessons Learned From Crossings in Beaver	24
MOU Between UDOT and DWR	26
US 6 Wildlife-Vehicle Collisions	28
References	30

SUMMARY

The Wildlife QIT found domestic animal-vehicle collisions to be as significant as wildlife animal-vehicle collisions and recommended the development of this toolkit. The objective of this toolkit is to contain a summary of valuable information regarding animal-vehicle collisions that can be used consistently throughout the Department and updated as needed to reflect current practices.

BACKGROUND INFORMATION

During the last decade animal-vehicle collisions have been increasing around the world; largely due to the increased traffic volumes on roadways bisecting wildlife habitats. Several studies have been performed in Arizona, Colorado, Florida, Nebraska and numerous other states identifying various countermeasures for reducing these collisions. The Federal Highway Administration (FHWA), Transportation Research Board (TRB), American Association of State Highway Transportation Officials (AASHTO), along with other transportation agencies have all participated in many of these studies to determine the effectiveness of each countermeasure. Within the Utah Department of Transportation (UDOT) several countermeasures have been tried with varying success rates; some worked well, some worked, and some were valiant attempts to make a difference. Knowing the numerous studies available on all wild animal-vehicle collisions UDOT managers recommended a Wildlife Quality Improvement Team (QIT) to evaluate what needs to be done in Utah. This toolkit is a result of the efforts of that Wildlife QIT.

The purpose of the Wildlife QIT was to coordinate team efforts on animal-vehicle conflicts from the initial planning phase of a "project" thru the maintenance phase. A "project" is defined as any roadway improvement on a state route intended to address animal-vehicle conflicts.

Data Collection

The following section offers additional background on the actual data collection used for this toolkit. There were many avenues to take and frequently the Wildlife QIT was asked how they identified countermeasures as well as specific areas of the state where animal-vehicle collisions occur.

Literature Search

The first step for the Wildlife QIT was to determine what information was available to make decisions from. An in depth literature search provided study information from other states, Canada and Europe. Also found were new products ranging from whistles and reflectors to video detection. This information was reviewed, compiled and discussed resulting in the lessons learned or "toolkit" approach. The Wildlife QIT wanted to provide all areas of the Utah Department of Transportation with a list of countermeasures and where possible the identified effectiveness of these countermeasures.

Additionally, the Wildlife QIT looked at all available studies for Utah regarding animal-vehicle collisions. Several university studies were found as well as Department studies that had not been published. This information was evaluated and a new list of countermeasures specific to Utah was developed. In addition,

regional experts were identified, contacted and visited with to determine what ongoing studies were available.

Sources of Data

The second step for the Wildlife QIT was to determine what data was available regarding animal-vehicle collisions. Each region within the Utah Department of Transportation has a carcass removal contract. However, it was quickly noted that each region handles the removal, payment and tracking of animals differently. This identified several concerns: comparability statewide, repeatability, and ease of evaluation of the data.

The next source of data came from UDOT Traffic & Safety in regards to their Crash Data Almanac. This system is available to all UDOT employees and relies on the accident reports filed by local law enforcements officers. This data can be sorted with simple filters (route, milepost, type of hit, date, time of day, etc.), mapped and printed as needed. In regards to comparability and repeatability this appeared to be the best choice.

Additionally, the Utah Division of Wildlife Resources (DWR) tracks animal-vehicle collisions as well and John Bissonette gathers information on select projects throughout the state. This information provides a good check against UDOT data, but neglects domestic animal-vehicle collisions and is not readily available for UDOT personnel to evaluate on a regular basis.

In conclusion, the Wildlife QIT decided to use the UDOT Traffic & Safety Crash Data Almanac to gather all animal-vehicle collisions per state route over a four-year period (2000-2003).

Hot Spot Development

As the Wildlife QIT analyzed all animal-vehicle collisions per state route it was apparent that both wildlife and domestic hits could be addressed in a single document. The focus was on developing a consistent approach for all the divisions within the department to follow when addressing animal-vehicle conflicts along state routes.

Current "hot spots" were identified statewide based on the four-year period and listed individually to give a starting point for any of the approaches recommended in this toolkit. It is not a step-by-step manual on how to fix every area where there is an animal-vehicle collision, rather a single source document with ideas and suggestions compiled from experiences here in Utah, in North America and abroad. "Hot spots" were defined with the following criteria using an accumulation of 2000-2003 UDOT Traffic & Safety accident data*:

- Domestic Vehicle Collision "Hot Spots" (Greater than 4 Accidents/Mile)
- Wildlife Vehicle Collision "Hot Spots" (Greater than 20 Accidents/Mile)

**Based on a similar research study prepared by Dr. Joseph Perrin & Rodrigo Disegni from the University of Utah in November 2003. (See Appendix for full Abstract.)*

This criteria was established where the natural break (i.e. the point where the number of hits per mile exceeded the "typical" number of hits per mile) occurred in the traffic data. Nearly all of Utah's roadways have animal-vehicle collisions; the key was to identify where the greatest number of those collisions were

occurring and if that data was in line with previous data. Reassuringly, the data lined up with a previous University of Utah Research Study (as noted above) and was only substantially different where countermeasures had already been taken by UDOT Construction or Maintenance to reduce the number of animal-vehicle collisions. The following table indicates the animal-vehicle accident severity and costs gathered as part of the University of Utah Study.

Animal-Vehicle Accident Severity and Costs

(1992-2001)		Wild		Domestic		
Severity	Cost Per Accident	Number of Accidents	Cost in Millions	Number of Accidents	Cost in Millions	Total Cost in Millions
1	\$2,300	20,629	\$47.4	3,367	\$7.7	\$55.1
2	\$6,000	582	\$3.5	328	\$2.0	\$5.5
3	\$45,000	418	\$18.8	294	\$13.2	\$32.0
4	\$565,000	293	\$165.5	242	\$136.7	\$302.2
5	\$3,000,000	10	\$30.0	15	\$45.0	\$75.0
	Total	21,932	\$265.3	4,246	\$204.7	\$470.0

Note: The accident severity number corresponds to the following: (1) No Injury; (2) Possible Injury; (3) Bruises and Abrasions; (4) Broken Bones or Bleeding Wounds; and (5) Fatal.

The costs per accident figures in the preceding table are based on vehicle damage and injury only. The cost of human life for a severity level 5 accident is estimated to be valued at \$3 million per person. These costs do not include the UDOT expenses for carcass removal (\$25.00/ carcass), or delay cost to the traveling public, which is \$17.50/person/hour.

The Utah Division of Wildlife Resources estimates the value of a deer or elk at \$488 per year (i.e. a 3 year old deer would be valued at \$1464) based on the hunting-related expenses divided by the combined herd sizes. Looking at the hunting-related expenses divided by the number of harvested animals the dollar value jumps substantially to \$4,108. Somewhere in the middle of these values are the restitution values the Utah Code prescribes for illegal taking, possession, or wanton destruction of protected wildlife: \$750 per animal for elk, \$400 per animal for deer, and \$8,000 per animal for trophy elk or deer. Cost analysis in this report will use the value of \$1,500 per wild animal. For additional figures directly related to deer-vehicle collisions see John Bissonette's comments in the Appendix.

For domestic animals, the typical value of a horse in Utah ranges from \$1500 to \$2500, with exceptions for racing or breeding stock (which can cost well into the tens of thousands of dollars range). Typical cattle prices range from \$2000-\$4000 depending on the weight, with exceptions for breeding stock (which can also sell in the thousands to ten thousands of dollars range). On high volume freeway segments which can carry 2090 passenger car equivalent per lane per hour (LOS D, as defined in the AASHTO Green Book: "Policy on Geometric Design of Highways and Streets"), an accident which closes traffic lanes would cost the traveling public an additional \$37,000 per lane/ hour in delays. (The \$37,000 is the average annual crash cost determined by the delay cost to the traveling public of \$17.50/person/hour times the passenger car equivalent per lane per hour, which is 2090 for a high volume freeway segment. The result being \$36,575 that is then rounded to the nearest thousand to estimate \$37,000 per lane/hour in delays.)

Cost/Benefit is calculated by multiplying the average annual crash costs times the design life of the measure and dividing this number by the estimated cost of the crash prevention measure. The design life may vary per measure used, i.e. a sign with flashers should be installed based on a design life of 5 years whereas a deer crossing is installed based on a design life of 30+ years with minimum maintenance. Crash costs can be estimated using the above table. For a measure to remain in consideration, the cost/benefit ratio should be 2 or higher.

$$\text{Cost/Benefit} = \frac{(\text{Average Annual Crash Cost} \times \text{Design Life})}{(\text{Estimated Cost})}$$

On the next page the Domestic "Hot Spots" are listed by region and route followed by the Wildlife "Hot Spots." Each "Hot Spot" is identified by a single milepost (MP) along the route and the number of accidents per mile (Acc/Mi) or a continuous section of roadway with the ranges in number of accidents per mile (i.e. 5-8-5, indicating that the first mile consisted of 5 Acc/Mi, increasing to 8 Acc/Mi, and then decreasing to 5 Acc/Mi). Additionally, the GIS maps have been included for domestic and wildlife "Hot Spots" throughout the state. For more detailed maps contact Paul West at (801) 965-4672 or paulwest@utah.gov.

Wildlife “Hot Spots”
(Greater than 20 Accidents/Mile)

Domestic “Hot Spots”
(Greater than 4 Accidents/Mile)

REGION 1

Single MPs

None

Continuous Section of Roadway

US 89; Entire Route (20-45 Acc/Mi)

*Note: Worst Route; Coordinate all efforts with
UDOT Environmental and Wildlife Biologist, Paul
West at (801) 965-4672 or paulwest@utah.gov.*

Single MPs

SR 39; MP 60 = 5 Acc/Mi

SR 39; MP 20 = 4 Acc/Mi

US 89; MP 397 = 8 Acc/Mi

SR 91; MP 21 = 5 Acc/Mi

SR 102; MP 10.5 = 4 Acc/Mi

Continuous Section of Roadway

US 89; MP 396.75—398.35 (5-8-5 Acc/Mi)

REGION 2

Single MPs

I-80; MP 138.91 (21 Acc/Mi)

Single MPs

SR 138; MP 35.4 = 4 Acc/Mi

Continuous Section of Roadway

SR 32; MP 15.8—16.6 (4-6-5 Acc/Mi)

SR 138; MP 6-7 (5-7-4 Acc/Mi)

REGION 3

Single MPs

US 40; MP 6 (23 Acc/Mi)

US 40; MP 12.65 (20 Acc/Mi)

Continuous Section of Roadway

US 40; MP 7.45—9.15 (20-33-20 Acc/Mi)

US 40; MP 88.57-89.13 (23-24-21 Acc/Mi)

SR 68; MP 34.79—35.76 (15-21-12 Acc/Mi)

US 89; MP 287.19—288.07 (14-21-10 Acc/Mi)

SR 92; MP 0.7—2.6 (12-30-10 Acc/Mi)

Single MPs

I-15; MP 262 (5 Acc/Mi)

Note: All accidents occurred in 2003

Continuous Section of Roadway

SR 121; MP 20.6—21.4 (5 Acc/Mi)

REGION 4

Richfield

Single MPs & Continuous Section of Roadway

None greater than 16 Acc/Mi

Single MPs

SR 24; MP 39.51 (4 Acc/Mi)

Note: All accidents occurred in 2002.

US 89; MP 83 (4 Acc/Mi)

Cedar City

Single MPs

None

Continuous Section of Roadway

I-15; MP 121.05-125.49 (10-23-10 Acc/Mi)

I-70; MP 3-5.5 (11-20-11 Acc/Mi)

Single MPs

SR 21; MP 105.7—106.7 (4 Acc/Mi)

SR 125; MP 1 (4 Acc/Mi)

SR 130; MP 40 (4 Acc/Mi)

Continuous Section of Roadway

US 6; MP 53.26—54.87 (3-4 Acc/Mi)

US 20; MP 6-7 (4-14-7 Acc/Mi)

Price

Single MPs

None

Continuous Section of Roadway

SR 191; MP 62.29—73.61 (10-20-10 Acc/Mi)

Note: Longest Stretch of 10+ Acc/Mi.

Single MPs

SR 10; MP 4.6—5.3 (4 Acc/Mi)

SR 163; MP 34.9—35.5 (4 Acc/Mi)

Continuous Section of Roadway

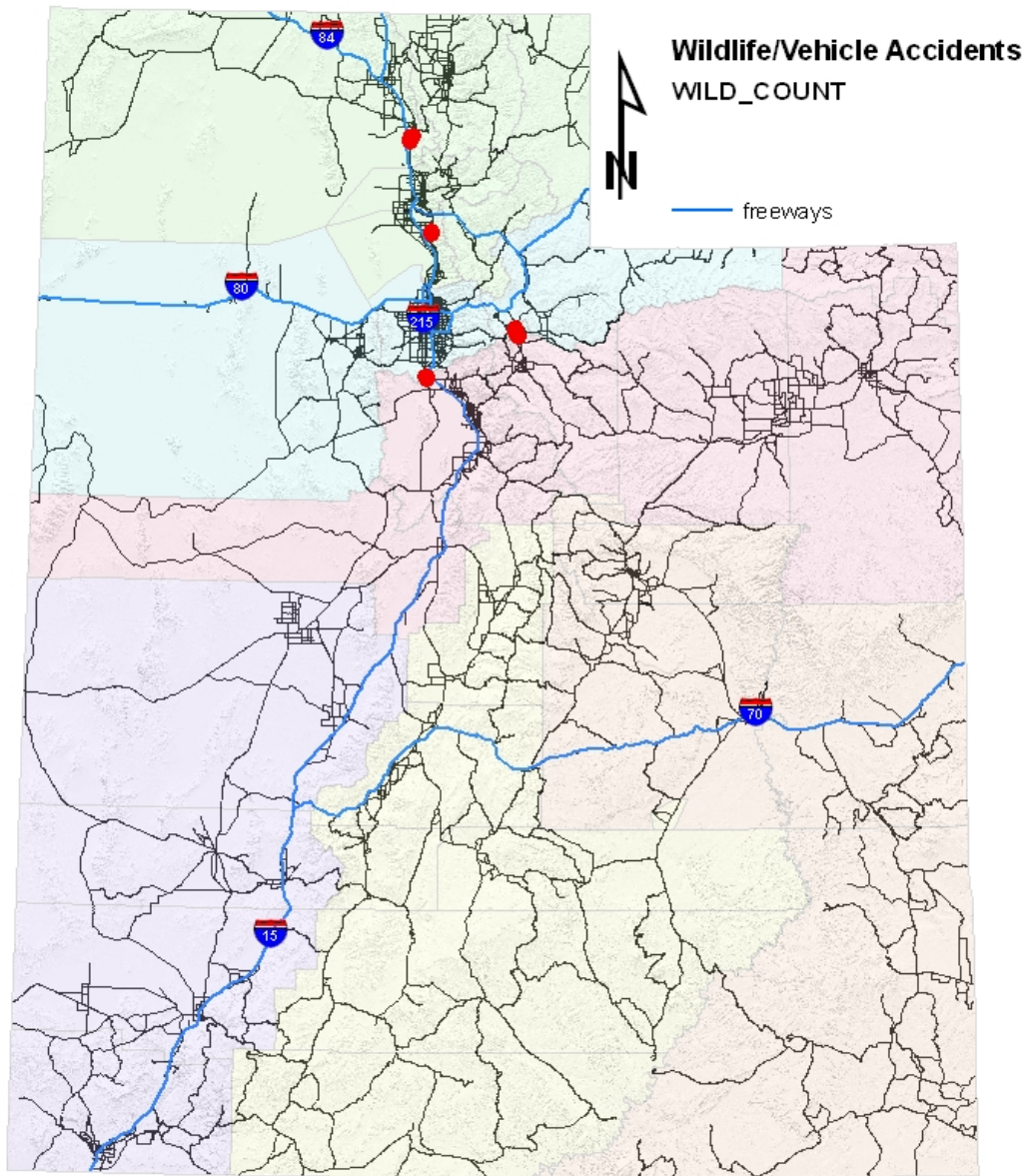
SR 191; MP 12.7—14.9 (5 Acc/Mi)

US 6

Note: Coordinate all efforts with Mike Miles, UDOT Project Manager

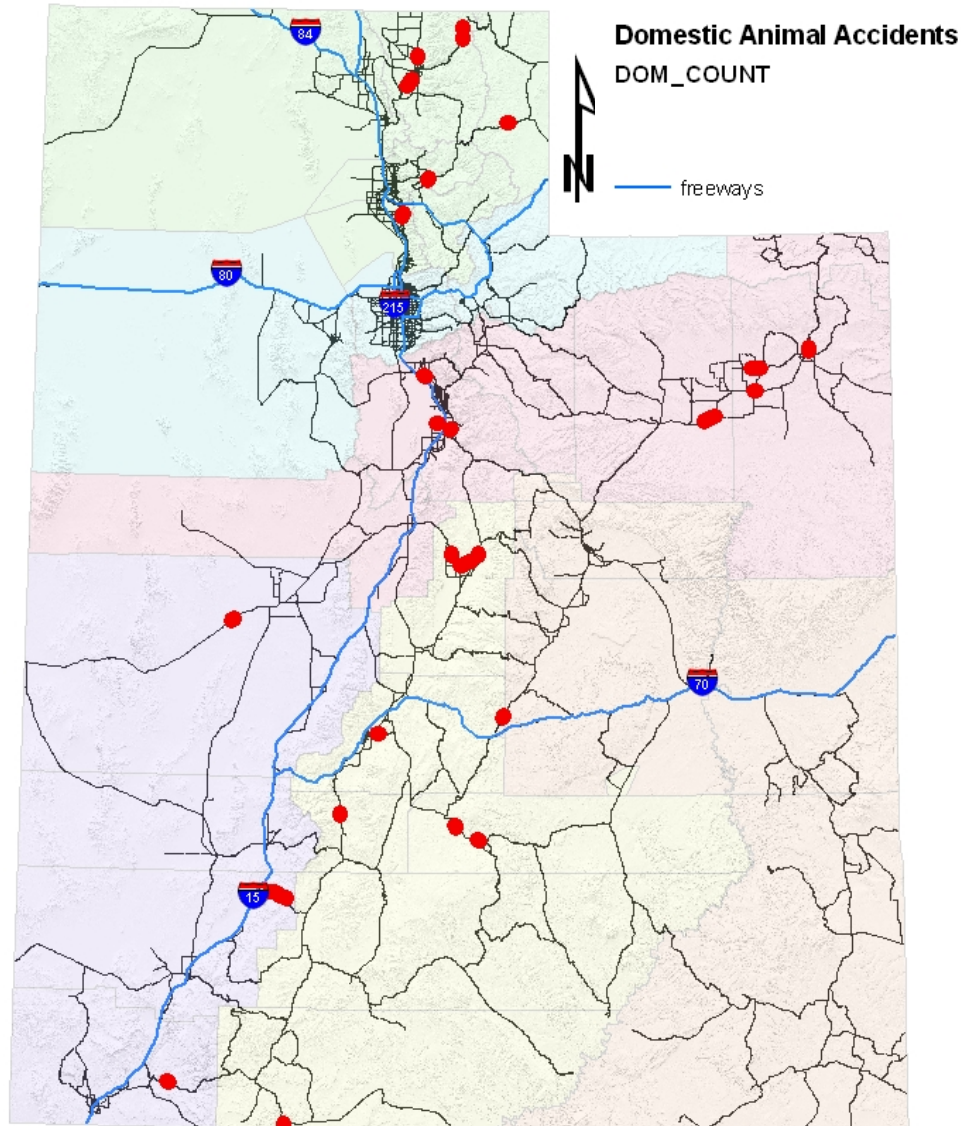
MP 175-177, 188-190, 195-197, 200-207, 216-221, 236-240

Wildlife Accidents 2000 to 2003



GIS Mapping of Wildlife "Hot Spots"

Domestic Animal Accidents 2000 to 2003



GIS Mapping of Domestic “Hot Spots”

Functional Classification/Prioritization of State Routes

Emphasis should be placed on reducing vehicle conflicts with wildlife and domestic animals on the highways that have the highest functional classification. The Interstate Highway and principal arterial networks are the highest functional classes of roadway systems and carry highest volumes of traffic. The wildlife QIT recommends prioritizing resources and efforts on solving conflicts on these critical transportation facilities. Roadways on the National Highway System (NHS), which includes the Interstate system, and important principal arterial roadways are also eligible for an additional funding under the Federal-aid NHS program.

The Functional Classification Maps are available from the UDOT website at:

<http://www.udot.utah.gov/index.php/m=c/tid=1224>

The Functional Classification maps will be updated in 2008 and again after the 2010 Census results are made available. Questions concerning the Functional Classification Maps can be directed to UDOT Program Development Unit.

THE PROCESS

Planning

UDOT Systems Planning and Programming, in cooperation with municipal planning organizations, and resource agencies, identify and recommend animal-vehicle crash prevention measures for "hot spot" area projects as part of UDOT's Long Range Plan. Hot spot areas where other improvements are not part of the Long Range Plan may be called out as separate projects. Appropriate funding levels are incorporated for actions proposed.

EARLY PROJECT EXAMINATION/IDENTIFICATION

Use Prioritization Mechanisms and perhaps GIS analysis in planning/budgeting. Emphasize early identification of issues in NEPA scoping.

The Planning divisions, both those in the Central Office as well as the regional planners, have access to GIS data to help them make determinations of wildlife impacts for every project. So far, such data consists of the following:

- Vehicle/Wildlife Accident Data
- Vehicle/Domestic Animal Accident Data
- Wildlife Connectivity Data
- Threatened and Endangered Species Data
- State Sensitive Species Data
- Statewide Critical and Sensitive Habitats Data

With these data sets, planners will be able to identify areas that need further analysis through corridor studies and to plan for adequate wildlife protection measures early in the project definition and selection process. This will facilitate early identification of issues while prioritizing projects to be added to the statewide transportation improvement program (STIP) and in NEPA scoping

EARLY ENVIRONMENTAL/PLANNING COORDINATION

UDOT Planning and Environmental divisions will work together to improve communication and to better integrate environmental considerations into planning activities, with the goal of a virtually seamless environmental process from planning through programming, design, permitting, construction and maintenance. Early consideration of wildlife and domestic animal crash “hot spots” will allow UDOT to develop potential remedies and costs based on existing data and proposed improvements and to provide more accurate estimates of overall project costs before the projects are programmed in the STIP.

LONG RANGE PLAN OF COSTLY PROJECTS

Some animal crash prevention measures will be too costly to perform as part of normal Region operations, spot improvements, and contingencies. Overpasses and underpasses are key examples. Exclusionary deer fencing may also fall into this category, depending on length and terrain. In these cases, proposed mitigation measures will need to be added to the statewide or metropolitan long-range plans.

The UDOT long-range transportation plan lists projects larger than those covered by maintenance and preservation activities. These projects include pavement reconstruction, shoulder widening, adding travel lanes, constructing new or rebuilding older interchanges, adding new highway alignments, and other capital-intensive activities. Project limits are typically defined by highway maintenance section, except for new alignments and localized improvements such as interchanges, bridges, and large-scale spot safety projects. Proposed animal protection measures and their projected costs should be included in the detailed descriptions for each project. In cases where a priority “hot spot” is located on a highway section not slated for other improvements, a separate mitigation project should be added to the list.

Projects are added to the long-range plan a number of ways, including Region input, public and resource agency comments, asset management, corridor studies, and local transportation master plans. One of the most effective ways to ensure needed mitigation measures are added to the long-range plan is to coordinate with the UDOT Planning Section, as individual corridor studies are prepared. In this way, these measures are included with the other identified needs of each corridor and their estimated costs.

In urbanized areas (Salt Lake – Ogden, Utah Valley, Dixie, Cache Valley), metropolitan planning agencies have the primary role for transportation planning, in partnership with UDOT. Their plans are prepared separately, and then integrated into the statewide plan. UDOT Environmental staff, resource agencies, and others who want to include wild and domestic animal-hit mitigation

measures into plans for local and state roadways in metropolitan areas should coordinate with these agencies.

Statewide Transportation Improvement Plan (STIP)

A proposed project must appear in the statewide transportation improvement program (STIP) before development funds can be expended on it. Each year, the Regions work with the Programming Section, UDOT leadership, and the Utah Transportation Commission to determine which projects in the LRP have highest priority and should be forwarded to the STIP, either in the Concept Development phase or directly in a funded year. In anticipation of this process, each Region may request that a detailed corridor study be performed to get a better understanding of corridor needs, project limits, level of environmental analysis needed, and anticipated costs. Specific mitigation measures should be recommended for any animal-hit “hot spots” identified within the corridor as part of these pre-STIP corridor studies.

Project Development

When “hot spot” area projects are advanced to the Concept Development phase of the STIP, the animal-vehicle crash prevention measures will be re-evaluated to determine: 1) If the measures remain appropriate; 2) If allocated funding is adequate; and 3) Cost/Benefit to the Department as well as the traveling public. Projects located in “hot spot” areas with no measures prescribed will also be re-evaluated and recommendations made, as appropriate. When a project moves to a funded year, animal-vehicle crash prevention should be part of the project purpose and need and an appropriate range of measures would be evaluated as part of the National Environmental Policy Act (NEPA) process. The NEPA process will help to select the most appropriate measure(s). As part of the NEPA document, performance measures should be developed to determine effectiveness. During final project design, the region environmental staff will ensure that all NEPA document commitments are made, including all animal-vehicle crash prevention measures.

Preconstruction

WILDLIFE

Design options help roadway designers provide wildlife with safe opportunities to cross roadways that result in reduced wildlife hits. Implementation of design options optimizes the mitigation measures placed in locations where animals naturally approach and cross a roadway. No single set of variables identifies preferred wildlife crossing locations. Every highway landscape is unique and requires mitigation measures and locations to be identified individually for each project. Once a “hot spot” has been identified guidelines for analysis include the following:

- Habitat suitability is the primary indicator for crossing activity.
- Landscape structure interaction with habitat suitability.
- Highway design influence on habitat suitability and landscape structure.
- Identify crossing areas for species.

Habitat and behavior of different species require professional input on the above items. Wildlife species do not cross highways randomly.

Design Considerations

- Highway Placement: The characteristics of the surrounding landscape are important in determining sections of highway frequently crossed. Placement of a highway within a landscape affects how each section is crossed.
- Highway Design: Location of roadside barriers and structures like fencing and underpasses have significant impact on where animals are most likely to cross the road.
- Variables for Crossing Zones: No single set of variables identifies a crossing zone. Landscape and location provide a unique solution for each situation.

Conflict Zones

- Highway segments crossed most frequently by wildlife as indicated by accident data, tracking data and professional knowledge. Features that correlate with conflict zones include suitable habitat, linear guide ways that encourage or discourage crossing depending on orientation to the roadway, and slope steepness/complexity.

Crossing Zones Or Hot Spots

- Location within a highway segment that has the highest rate of wildlife crossings. Features that correlate with crossing zones barriers, distance to cover, and linear guide ways.

Identification Criteria For Design Options

- 20 hits per mile over a 3-year period.

Design-Based Approaches To Reduce Wildlife/Vehicle Conflicts

- Combine habitat features on the roadside and the design of the highway to determine location of crossing zones. Crossing zones located where wildlife naturally cross the highway are the most successful to reduce wildlife/vehicle conflicts. On low volume roads use at-grade crossings. Maximize the at-grade crossing by minimizing the barrier effect of the highway. Use crossing structures on high volume/high speed roads to accommodate animal movements above or below the roadway. In unique and extraordinary circumstances overpasses may be used as coordinated with UDOT Environmental and the Utah Division of Wildlife Resources.

Option: At-Grade Crossing. Low Traffic Volumes

(Note: Option requires exclusionary fencing for a minimum of 1 mile from each direction leading to the crossing and on both sides of the roadway for a total of 4 miles of fencing with escape ramps spaced at approximately ¼ mile intervals as coordinated with the UDOT Wildlife Biologist. An escape ramp is an earth structure that allows wildlife in the right-of-way to exit the right-of-way. See UDOT Standard Drawings FG Series.)

Possible Solutions

- Permanent Signing
- Temporary Signing
- Exclusionary Fencing (8 foot height) + Escape Ramps
- Locate in natural crossing areas
- Roadside Vegetation Management
 - Mowing or clearing of Right of Way
- Geometric Considerations:
 - Reduce speed limit
 - Curvilinear Curves
 - Wider cross section and narrower lane
 - Bridge height and length

Option: Below- Or Above-Grade Crossing

(Note: Option requires exclusionary fencing for a minimum of 1 mile from each direction leading to the crossing and on both sides of the roadway for a total of 4 miles of fencing with escape ramps spaced at approximately ¼ mile intervals as coordinated with the UDOT Wildlife Biologist. An escape ramp is an earth structure that allows wildlife in the right-of-way to exit the right-of-way. See UDOT Standard Drawings FG Series.)

Possible Solutions

- Exclusionary Fencing (8 foot height) + Escape Ramps
- Recommend using a structure rather than box or pipe culverts
- Simple span bridge with no or reduced vertical supports (pillars)
 - "These have proven much more effective than box or corrugated steel culverts for getting animals under the freeway, particularly when we are talking about elk."
Bruce Bonebrake, DWR Habitat Manager
- Locate in natural crossing areas
- Design natural bottom and side slopes in structures
- Minimum vertical clearance for underpass structure of 16 feet with aspect to length ratio of 9.2 or greater
- Maximize daylight area with natural slopes
 - Avoid use of vertical walls or walls covered with rock or concrete
 - Daylight underpass in center median where possible

Successful reduction wildlife/vehicle hits considers the structure of the surrounding landscape, highway design, and species. See mitigation measures.

DOMESTIC

Design options to reduce domestic hits on roadways.

Identification Criteria for Design Options

- 4 hits per mile over a 3 year period

Design-Based Approaches To Reduce Domestic/Vehicle Conflicts

- Fencing – UDOT Standard Drawings FG Series
- Swing Gates – UDOT Standard Drawings FG Series
- Cattle guards – UDOT Standard Drawings SW Series
- Signing (Temporary And Permanent)
- Public Information Outreach with Rancher Associations

Construction

UDOT will ensure that all commitments are incorporated into construction projects. If circumstances suggest modifications to the prescribed measures, then region environmental staff and relevant resource agency personnel will meet with construction staff to review the suggested changes. Regular site visits are scheduled for region environmental staff and resource agency staff to ensure proper construction of the crash prevention measures.

Maintenance

The crash prevention measures will require maintenance to ensure that they continue to function. Appropriate maintenance plans for the various measures are developed by UDOT in conjunction with wildlife resource agencies. Where possible, monitoring of measures should be performed to determine effectiveness. Accident data should be collected during this phase and analyzed to determine the effectiveness of the measures. These analyses are collected and used to determine appropriate measures for future projects. Crash prevention measure locations and goals are included in region maintenance goals. Suggested maintenance activities will be provided by UDOT Environmental division, design engineers, and resource agency staff.

Possible Solutions

- Roadway Maintenance
 - Winter Maintenance (deicing or anti-icing salt mixes)
- Roadside Vegetation Installation & Maintenance
 - Choice of Reclamation Species
 - Mowing and Clearing of Right of Way
- Carcass Removal
 - Prevent Accidents by Hitting Carcass
 - Prevent Scavengers that can be a safety issue

MITIGATION MEASURES

National Mitigation Measures

WILDLIFE HITS MITIGATION MEASURES

The following mitigation measures are recommended to reduce hits by improving existing conditions. Wildlife mitigation measures work best when wildlife habitat and movement impacts to a roadway system are considered during development and operation. Generally, wildlife/vehicle hit occurrence is highest in the evening, nighttime, and early morning hours. Place mitigation measures at natural crossings.

Proven Counter Measures for Mitigation:

- Roadside Vegetation Management: Vegetation clearing up to 10 feet from the edge of the roadway. (20% reduction)
- Exclusionary Fencing 8 feet in height. This provides a physical barrier between animal and roadway. (60%-97% reduction)
- Underpass Crossings (structure, not box or culvert)+ Exclusionary Fencing 8 feet in height and escape ramps at approximately ¼ mile intervals. Underpass crossings need to evaluate location and landscape when determining placement. Suggested spacing is one mile.
- Escape Ramps. These are used 8 to 11 times more than one-way gates. UDOT has implemented new Standard Drawings for escape ramps; see UDOT Standard Drawings FG Series. ("Effectiveness of Earthen Ramps in Reducing Big Game Highway Mortality in Utah" by John A. Bissonette and Mary Hammer, November 2000)
- Exclusionary Fencing + Underpass/Overpass Crossing + Escape Ramps
- Roadway lighting (18% reduction)
- Reduction in posted speed limit
- Signing – Overuse/misuse will reduce effectiveness. Seasonal use of flashing signs has been more effective than permanent signs.
- Public information and education
- Hunting or Herd Reduction
- Electrified Fence
- Communication/Coordination with other resource agencies.
- Policies/Standards – Policies/Standards must account for costs and benefits.
 - o Maintenance
 - Winter Maintenance
 - Roadside Vegetation Installation and Maintenance
 - Carcass Removal
 - Integrated Roadside Vegetation Management Plan
 - Fence Maintenance
 - o Design:
 - Posted Speed Limit-reduction in speed
 - Curvature-more curvilinear

- Cross Section-wider roadway (i.e. wider shoulder, right of way, increased clear zone, etc.) with narrower lane width
- Bridge Height and Length (i.e. simple span bridge, open at the top, avoid the use of pillars, upright reinforcing or retaining walls that reduce the openness of the structure)
- o Planning
 - Roadway Alignment Location
 - Project Planning

Other Methods With Unproven Success:

- In-Vehicle Technologies
 - o Animal Sensing Devices and In-Vehicle Displays
 - Not tested thoroughly
 - Can give false readings
 - Potential for Problems with Driver Compliancy
 - Information Overload/Distraction
 - High cost
- Deer Whistles
 - o Questionable Scientific Evidence of Effectiveness
 - o Deer May Not be Able to Hear Whistles
- Roadside Reflectors and Mirrors
 - o No Conclusive Study Showing Effectiveness
 - o High Installation Cost
 - o High Maintenance/Cleaning Cost
- Designated Deer Crosswalks
 - o Minimal Evidence of Reduced Road Kill After Installation
 - o Animals on ROW Regardless
 - o Fencing Needs to be Maintained
 - Gates Need to be Closed

DOMESTIC ANIMAL HITS MITIGATION MEASURES

- Fencing – replace/repair/construct
- Electrified Fence
- Signing – temporary or permanent
- Cattle guards, see UDOT Standard Drawings SW Series
- Temporary signing in open range areas
- Rancher Association interaction

Mitigation Measures In Utah

LESSONS LEARNED FROM CROSSINGS IN BEAVER

Contacted the Area Supervisor Ree Schena and the Beaver Station Supervisor Doug Beeson by telephone to find out their thoughts on the over/under passes installed in 1988 South of Beaver on Interstate 15. For a detailed accounting of these lessons learned see the Appendix.

Summary

- 1) Encourage Division of Wildlife Resources to supply useful information about existing wildlife passages such as the overpass near Beaver. It will be difficult to select potential remedies without more details about successes, failures, and needed improvements. The incentive for the Division of Wildlife Resources to collect and share information is enhanced if we let them know that it is vital in order to make something happen.
- 2) Underpasses are good for deer and elk. (if they are properly designed simple span structures)
- 3) Deer, not elk, use the Beaver overpass.
- 4) The underpass made use of existing drainage and frontage road. It is in a good natural crossing location.
- 5) Suggested driving cattle through to make trail for deer to follow.
- 6) Current traffic volume creates more hits and less success for deer to survive Interstate crossing anytime, day or night.
- 7) The underpasses work well because they are wide open, have daylight, and are natural.
- 8) One underpass has a Frontage Road that impedes wildlife crossings.
- 9) Animals are hesitant to use the Overpass because it is narrow, consists of two separate structures that are far apart. (Overpass could also be improved with landscaping that is similar to the surrounding environment and blocks out the highway from view and noise; this type of work to be coordinated with Paul West as well as the Region Landscape Architects.)
- 10) After 16 + years the deer have accepted the underpasses as a migration route.
- 11) Significant drop in deer kills. Only 1 to 2 per year. Prior high number of kills.
- 12) Location of exit ramps on project near Cove Fort too close to clear zone.
- 13) Old UDOT Standard for escape gates was not effective. Gates were blocked because animals go wrong way into the ROW.

LESSONS LEARNED: US 6 Hot Spots

Initially, when using UDOT Traffic & Safety's Crash Data Almanac, US 6 had no wildlife vehicle collision "hot spots". After sending this toolkit out for review Utah DWR forwarded comments from the Draft EIS for US 6 that provided wildlife-vehicle collision totals of much greater magnitude than what UDOT's records indicated. The UDOT numbers showed 77 hits per year from milepost 177-234 and Utah DWR reported 590 hits per year from milepost 174-270. After further investigation it was discovered the Utah DWR numbers were more realistic. The difference was accounted for by the presence of coal hauling trucks that were having wildlife collisions and not stopping or reporting them. The UDOT Maintenance Area Supervisors in Region Three and Region Four, Price District

verified this information. As a result of this information US 6 and its appropriate mileposts were added to the wildlife-vehicle collision "hot spot" as a stand-alone route.

ADDITIONAL LESSONS LEARNED IN UTAH

Deer Gates

Only 16% of the deer that approached the one-way gates installed in Summit County actually used them. Therefore, it was determined that the gates were not effective.

Reflectors

On US 6 (Helper to Price) & I-80 (Wanship to Coalville) reflectors were installed to startle deer off the roadway when a vehicle's approaching headlights connected with the lens of the reflector. Spacing of the reflectors varied from 25 to 50 feet depending on the tangent or curve of the roadway. At the time of these test sections, the reflectors were \$27.50 each attached to a new delineator post at \$12.50 each. There were no reductions in the total number of deer-vehicle collisions. In fact, maintenance crews reported an increase in deer kills. It appeared to the maintenance crews that the deer became trapped within the reflectors, placing them in the roadway. There was a question of the reflectors working for mule deer as they were designed for whitetail deer. In addition, once the lens became dirty they no longer reflected. This was very frustrating for the maintenance crews assigned to these test sections of roadway as they had other tasks of higher priority. A few other test sections were tried with similar results. In the end, the use of reflectors was not recommended as an effective means for reducing deer-vehicle collisions.

Seasonal Signing

One of the most effective measures used in Utah is seasonal signing. By installing flashers on deer crossing signs during the spring and fall when the highest numbers of animal-vehicle collisions often occur, drivers pay closer attention. The key to this measure is narrowing the "exposure" timeframe of the flashing signs. The longer the flashers remain in place the less effective they prove to be as drivers adjust to seeing them. Therefore, it is important that the time periods be clearly identified prior to installing the flashers on the signs. This can be done through a detailed query of the Crash Data Almanac System for a particular state route.

Crosswalks

In Summit County, a research project in Phase I of 3 installed painted crosswalks with riprap bordered dirt-crossing trails connecting to swing gate crossings in the deer fence. Three crosswalk use attempts were witnessed in the first three months after the crosswalks were installed. All three of these wandered outside the "confines" of the crosswalk. Six subsequent crossings were observed where the deer remained within the "confines" of the crosswalk; cars hit two of these. Therefore, it was determined that the crosswalks were ineffective. Due to lack of interest and funding following Phase 1 the next two phases were cancelled for this research project.

New Deer Crossing Standards

Recently, the Standards Committee approved two types of deer crossing standards. The first is for areas where high migratory crossings have been identified and coordinated with the Division of Wildlife Resources. It consists of three deer escape ramps; two running along the fence line from

either direction and one running perpendicular to the fence with fencing guiding the animals away from the roadway (see UDOT Standard Drawings FG Series for further detail). The second is the typical deer crossing with a single perpendicular escape ramp along the fence line.

Mitigation Measures for Further Research:

- Roadway Lighting
 - Roadway lighting may improve visibility
- Speed Limit Reduction
 - Speed limit reduction may improve driver reaction time
- Deicing Salt Alternatives
 - The use of salt for deicing may attract deer to the roadside
- Deer Crossing Signs And Technologies
- Typical deer symbol crossing warning signs
- Lighted "DEER XING" signs
- Animated deer crossing signs
- Utah primary and secondary temporary deer crossing sign designs
- Michigan temporary deer crossing sign design
- Dynamic elk sign and sensor system
- Solar powered animal sensors
- Repellents
 - Chemical
 - Biological
- Public Information And Education
- <http://www.deercrash.com/releases.htm>
- <http://www.dps.state.ia.us/deercrashes/>
- <http://www.state.me.us/mdot/safety-programs/maine-crash-data.php>
- <http://www.semcog.org/TranPlan/TrafficSafety/MDCC/index.htm>

POLICY & STANDARDS

A UDOT Policy that considers Planning, Project Development, and Operations aspects of wildlife and domestic hot spots should be developed and implemented. The policy may include determination of Cost/Benefit, Hot Spot definition and location, prioritization, project identification, environmental coordination, design, construction responsibility, maintenance, mitigation measures, project funding, and performance measures. UDOT Standard Drawings and Specifications need to be continually reviewed to incorporate the most up to date methods in reducing wildlife and domestic animal/vehicle hits.

COMMUNICATION/COORDINATION

Collaboration with stakeholders provides opportunities to address wildlife and domestic animal concerns associated with transportation facilities. Many channels of communication already exist such as coordination with the US Fish and Wildlife Service, FHWA, UDWR, and property owners adjacent to our right of way on a project-by-project basis. A general Memorandum of Understanding (MOU) between UDOT and DWR recognizes the importance of collaboration on transportation and associated wildlife impacts and mitigation.

In addition to the key state and federal resource agencies, communication/coordination with other stakeholder agencies such as EPA, USACE, SITLA (State Institutional Trust Lands Administration), USFS, BLM, and Non-Government Organizations (NGOs) may be beneficial, as well as, individual involvement with farmers/ranchers, concerned citizens, and researchers/experts. UDOT region and central environmental staff should also be consulted and can supply stakeholder contact information beyond those listed for UDWR and USFWS.

CONTACTS

Informational Websites:

FHWA Critter Crossing: <http://www.tfhr.gov/pubrds/marapr00/critters.htm>

AASHTO Center for Environmental Excellence: <http://environment.transportation.org/>

ICOET (International Conference on Ecology and Transportation):

www.itre.ncsu.edu/cte/icoet/html

Wildlife Studies in Utah by Utah State University:

<http://www.cnr.usu.edu/faculty/jbissonette/index.htm>

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1115 North Main

Springville, UT 84663

Habitat Manager	Ashley Green	(801) 491-5678
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Northeastern Region (Contact for UDOT Region Three) (435) 789-3103

152 East 100 North

Vernal, UT 84078-2126

Habitat Manager	Steve Brayton	(435) 781-5358
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Southern Region (Contact for UDOT Region Four) (435) 865-6100

622 North Main

Cedar City, UT 84720

Habitat Manager	Bruce Bonebrake	(435) 865-6111
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Southeastern Region (Contact for UDOT Region Four) (435) 636-0260

475 West Price River Drive, Suite C

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Habitat Manager	Chris Colt	(435) 636-0279
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U.S. Fish and Wildlife Service

2369 West Orton Circle

West Valley City, UT 84119

(801) 975-3330

Field Supervisor	Henry Maddux
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Threatened & Endangered Species Coordinator	Laura Romin
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FUNDING SOURCES

Sources of funding for wildlife crossings

- Dedicated Hunter funds from DWR
- Code 1 Maintenance
- 3R Projects
- Reconstruction Projects
- Safety Spot Improvements
- Maintenance Spot Improvements
- Hazard Elimination Safety
- Transportation Enhancement
- High Priority Projects/Demonstration Projects
- Highway Research
- Priority Technology
- Roadside Vegetation Plan
- USFS & BLM Mitigation Funds
- FHWA Technology Transfer Funds
- FHWA Environmental Streamlining Funds

PERFORMANCE MEASURES

To evaluate crossing effectiveness crossing structures need to be monitored and long-term trends in animal hits pre- and post-construction need to be gathered. In any individual year many variables can contribute to changes in accident rates. Additionally, as ADT changes on the facility, that change should be evaluated as part of the performance measure. If data is available about the health of the herd, it should also be part of the evaluation.

To compare two years or two time periods, divide the number of carcasses removed by the ADT. The assumption is that as ADT increases, the numbers of accidents are likely to increase. This comparison can only be used to compare the same stretch of roadway and not to compare different roadways.

Accident data on both sides (1-5 miles) of the proposed structure, or the fence that extends from the structure, should also be examined pre- and post-construction. This will help indicate crossing effectiveness and migration trends.

Additionally, each region should establish where they are today in regards to accident numbers and identify what the future goal is for that section of roadway. The before/after findings should be posted and shared with others, consider using UDOT's Dashboard.

APPENDIX

Latest UDOT Research Study Findings:

1) Abstract for UDOT Research Study Report No. UT-03.31 "Animal-Vehicle Accident Analysis" Authored by Dr. Joseph Perrin and Rodrigo Disegni of the University of Utah, November 2003 -- "Vehicle-animal accidents represented 4.6% of US automobile accidents with more than 1.5 million accidents a year, 150 deaths and \$1.1 billion in vehicle damage. Animal related accidents in Utah represent 1.2% of statewide automobile accidents. In 2001 there were 2,688 vehicle-animal collisions, including 3 death, and 235 injuries. In Utah, animal related accidents are subdivided in wild and domestic animals. Domestic animals include livestock, such as cows and sheep or horses. Wild animal most often refer to deer, elk and moose. Using 10-year statewide accident information, the problem locations are identified and a comparison between domestic and wild animal accidents based on severity is examined. The accident analysis determined that the domestic animal accidents represent only 16% of the animal-vehicle accidents, they are more severe than wild animal accidents. Domestic animal accidents result in injury 23% of the time while wild animal accidents result in injury only 7% of the time. When a motorcycle is involved, it was found the 94% of the animal-motorcycle related accidents resulted in injury compared with only 11% of the non-motorcycle-animal accidents. Overall, there is a 7.9 times greater chance of a fatality with domestic animal accidents compared with wild animals. This is attributed to the height and weight of domestic animal relative to the common wild animal. While many countermeasures are attempted such as whistles and reflectors, the principal countermeasure to control animal related accidents has been the use of fences along the roads. The 4-foot high right-of-way fences are effective for the domestic animals but the wildlife animals requires the higher 8-foot fences since deer can easily circumvent the 4-foot fence heights. Alternative countermeasures such as one-way deer gates and ecopassages are also reducing wild animal hits. This study utilizes UDOT's CARS accident database to identify the vehicle-animal crash problem in Utah. The study describes the extent of the problem; some literature on various countermeasures used throughout the world, and finally identifies the most dangerous section of routes between the years 1999-2001 in terms of the accidents per mile for the wild and domestic animals."

2) Additionally, Utah State University through the efforts of John Bissonette and his research students has extensively evaluated the deer-vehicle collisions in Utah. John Bissonette has also been working with Larry Cook, Utah CODES Director, at the University of Utah Intermountain Injury Control Research Center, School of Medicine to address the linked databases. Here are the figures and some of the recommendations they have come up with as emailed to UDOT in June 2005:

"The overall cost for 13,020 collisions from 1996-2001 in Utah was \$45,175,454, resulting in an estimated average per year cost of \$7,529,242 and an overall per crash value of \$3,470. Contributions to total costs varied widely: estimated human fatality costs of \$24 million accounted for 53%; vehicle damage costs of \$17,521,970 accounted for 39%; deer loss valued at \$2,651,083 totaled 6%, and human injury costs of \$1,002,401 accounted for 2% of total costs. Utah had an average of \$2,170 deer-vehicle collisions each year accounting for 4.0% of all vehicle collisions that occur each year. When property damage, human injury and death, and wildlife loss are

included, we estimated overall costs of ~\$7,529,242 per year in Utah. If only 1/6 (Decker, Loconti-Lee, & Connelly, 1990) to 1/2 of all deer-vehicle collisions are actually reported (Romin, 1994), the impacts of DVCs could be greater than what we calculated. (Romin & Bissonette, 1996). Our data support the findings of the CDC (2004): more people were injured in deer-vehicle collisions during the fall and the dawn and dusk hours when animals are more active. We suggest that mitigation measures, including driver education and outreach, should take into account the temporal patterns associated with DVCs. Placing crossings based on the analysis of collision data should increase the efficacy of the crossing structures, thereby decreasing wildlife-vehicle collisions and increasing public safety. The Center for Disease Control (CDC) reported that nonfatal wildlife-vehicle related injuries accounted for <1.0% of the ~3 million people treated in U.S. emergency departments annually due to motor-vehicle related injuries (2003). However, the CDC also argued that wildlife-vehicle collisions and associated consequences, including property damage, wildlife loss, and human injury and death are important concerns in rural locations with large deer populations (2003). It is clear that the ecological, social, and economic consequences of animal-vehicle collisions make this an important issue in Utah and across the country."

Lessons Learned From Crossings in Beaver:

Contacted the Area Supervisor Ree Schena and the Beaver Station Supervisor Doug Beeson by telephone to find out their thoughts on the over/under passes installed in 1988 South of Beaver on Interstate 15. For a detailed accounting of these lessons learned see the Appendix.

Encourage Division of Wildlife Resources to supply useful information about existing wildlife passages such as the overpass near Beaver. It will be difficult to select potential remedies without more details about successes, failures, and needed improvements. The incentive for the Division of Wildlife Resources to collect and share information is enhanced if we let them know that it is vital in order to make something happen.

Ree

- Underpasses are good for deer and elk.
- Deer and not elk use overpass.
- The crossing numbers of 451, 641, and 279 are probably for a year.
- Deer/elk could hear the motion detector click and then got a flash. He felt this scared some animals from using the crossing.
- The underpass made use of existing drainage and frontage road—Good!
- Suggest drive cattle through to make trail for deer to follow.
- Current traffic volume creates more hits and less success for deer to survive Interstate crossing anytime, day or night.

Doug

- The underpasses work well because they are wide open, have daylight, and are natural.
- One underpass has a Frontage Road that impedes wildlife crossings.
- Animals are hesitant to use the Overpass because it is narrow, consists of two separate structures that are far apart.
- The cameras click with a motion detector and FLASH the animal.

- After 16 + years the deer have accepted underpasses as a migration route.
- Significant drop in deer kills. Only 1 to 2 per year. Prior High number of kills.
- Location of exit ramps on project near Cove Fort too close to clear zone.
- Old UDOT Standard for gates was not effective. Gates were blocked because animals go wrong way into the ROW.

Contact Info:

Ree (435) 864-2183 or (435) 559-5612

Doug (435) 438-2624 or (435) 421-1104

MOU between UDOT and DWR:

Memorandum of Understanding
Between
Utah Department of Transportation
And
Utah Department of Natural Resources
Division of Wildlife Resources
For
Evaluation of
Wildlife and Habitat Impacts
And
Installation of
Wildlife Crossings of Highways

The Utah Department of Transportation (UDOT) and the Utah Department of Natural Resources (DNR), Division of Wildlife Resources (DWR) have stewardship responsibilities over the Utah natural environment and share the goal of a healthy environment for the State of Utah.

As a part of its program, UDOT attempts to protect the environment as it carries out its transportation responsibilities. UDOT studies and monitors the effects and impacts of its transportation program on wildlife.

The DWR has an interest and special expertise in the study, monitoring, and preservation of healthy wildlife habitat in the State of Utah in balance with the social and economic needs of the State.

This agreement is to establish a format for cooperation and information sharing for the mutual interests and success of the programs of these two agencies of the State of Utah.

In an effort to strengthen and further the environmental stewardship of both agencies, it is mutually agreed as follows:

A Task Force on Wildlife and Transportation Issues is created as a joint standing working group. The working group shall consist of at least two members, one designated by DWR and one by UDOT, and shall include such other members as are from time to time appropriate. The working group shall meet not less than quarterly. An annual report of their activities shall be prepared and shall be presented and reviewed at an annual meeting for administrative level review by both UDOT and DNR.

The Working group shall be charged to correlate the efforts of the agencies to maximize the mutual goals of each agency to the benefit of the State of Utah and its natural environment and wildlife and habitat health. Issues to be tracked include reducing collisions between wildlife and motor vehicles, wildlife migration routes, wildlife highway crossings, wildlife habitat segmentation, sensitive species protection, and other issues related to transportation and wildlife. The task force shall explore mutual

research opportunities and shall attempt to develop best management practices and associated demonstration projects.

UDOT shall present to DNR, for review and comment, a copy of the annual 5-year plan known as the State Transportation Improvement Plan (STIP). DNR will review upcoming highway improvement projects for opportunities for the agencies to cooperate in an effort to evaluate possible impacts of the individual projects on wildlife and to develop avoidance measures or mitigation of those impacts.

DNR shall provide UDOT with information regarding big game migration routes that cross State Highways.

DNR agrees to provide UDOT assistance, as requested on a project-by-project basis, on wildlife impacts and mitigation of impacts during its project development phase.

DNR and UDOT shall share information regarding the impact of highway operations on big game migration routes and the health of the herds using those routes.

UDOT shall invite DNR comments on all major highway reconstruction projects for consideration of the impacts on wildlife, and avoidance or mitigation measures.

Date: July 8, 2005
To: Ashley Green, Central Region Habitat Manager
From: Doug Sakaguchi, biologist & Anis Aoude, Central Region Wildlife Manager
Subject: Road kill information for Highway 6, from I-15 to I-70

Anis Aoude requested and received road kill pickup information from UDOT Region 3 for 2001 through May of 2005. For dead animals picked up along highways, UDOT contractors submit reports of road-killed animals, by highway, mile post and date. This raw data was entered into spreadsheets by year, and pages were created for each highway for which there were data. Twelve months of data (complete year) were available for only 2002 and 2004. (These spreadsheets are available electronically from Anis at the this e-mail address: .anisaoude@utah.gov.)

For Highway 6 (I-15 at Spanish Fork to I-70 near Green River, mile posts 174 to 290, respectively), the complete road kill pickup information (2002 and 2004 data) is shown in Table 1. (Information for the partial years of 2001, 2003, and 2004 are shown in Table 2 at the end of the report.)

Table 1. Highway 6, (from I-15 in Spanish Fork to I-70 near Green River, mile posts 173 to 290, respectively), big game mortality summary, 2002 and 2004.

YEAR	Months	No. of Months	Mile Posts	Deer Doe	Deer Buck	Total Deer	Elk Cow	Elk Bull	Total Elk	Total Big Game Killed
2002	Jan-Dec	12	176-276	294	74	368	43	6	49	417
2004	Jan-Dec	12	174-270	385	160	545	37	8	45	590

UDOT road kill data for years 2002 and 2004 show 417 and 590 big game animals were hit by vehicles, died along the highway and were picked up by UDOT contractors during the respective years. These are a minimum number of animals that were directly impacted by vehicle collisions on Highway 6 between mileposts 174 to 276. Some animals die beyond the highway right of way, which are not included in numbers submitted by UDOT's contractors; others may survive but remain crippled through the rest of their life; during the winter and spring, pregnant doe deer and cow elk are carrying fetuses, and are generally counted as only one dead animal.

The Draft EIS (DEIS) for Highway 6 (September 2004), using reported accidents on the highway from 1991 through 2001, state that only an average of 110 wildlife-vehicle accidents (wildlife strikes) occur annually (page 1-7) along this section of Highway 6. Granted the years for which reported accidents and road kill pick up data were collected were not concurrent, but they were all collected within the last 15 years.

The DEIS states that reported accident wildlife strikes are only 28% of the reported accidents on Highway 6, that there are no human fatalities associated with wildlife strikes, and that only 6% of wildlife strikes result in personal injury.

However, the data collected by UDOT contractors show that there are between 4 to 6 times the number of wildlife strikes (dead animals) annually actually occurring on Highway 6 than are being considered as wildlife strikes in the DEIS for Highway 6 road improvements. Rather than only 110 wildlife strikes occurring, based on 2002 and 2004 complete data, there are likely between 400 to 600 wildlife strikes annually on Highway 6, even though the majority of them are not being reported as accidents. This corresponds with Kassari and Bissonette's (2005) estimate of only 1/2 to 1/6 of vehicle strikes reported versus actual wildlife strikes occurring. With faster speeds, increased traffic volumes, and wider lanes of traffic to cross, the number of wildlife strikes will surely increase in the future. Kassari & Bissonette also list growing numbers of vehicle drivers, increasing miles traveled, and increases in population as additional factors which affect traffic volume, which will lead to increased vehicle strikes.

Road kill pick up numbers along Hwy 6 (between mileposts 173 to 290) in 2002 was 417 animals, of which 368 were mule deer. Kassari and Bissonette (2005) found that there were a minimum of 2,205 reported vehicle strikes state wide on Utah highways between 1992 and 2002, and a maximum of 2,577 reported vehicle strikes, annually. The number of road killed mule deer picked up along Highway 6 in 2002 make up between 14.3 to 18.2% of the total number of vehicle strikes (deer) reported annually throughout the whole state!

Road kill pick up data show that vehicle strikes to mule deer and elk create 4 to 6 times the number direct impacts to mule deer and elk than were presented in the DEIS for Highway 6. DWR should take a firm position on adequate wildlife crossing structures, associated big game fencing, highway escape ramps, habitat enhancement, etc., in an effort to mitigate for such large numbers of vehicle strikes that result in large numbers of dead wildlife.

Reference cited:

Kassari, C. and J.A. Bissonette. 2005. Deer-Vehicle Crash Hotspots in Utah: Data for Effective Mitigation. UTCFWRU Project Report No. 2005(1):1-128. Utah Cooperative Fish and Wildlife Research Unit, Utah State University, Logan Utah.

Table 2. Highway 6: I-15 to I-70 (MP 173 to MP 290) Big Game Mortality Summary. Years for which monthly data was not complete, and which are extrapolated to estimate annual big game road kill pick ups by UDOT contractor.

Partial YEAR	Months data were available	No. of Months	Mile Posts	Deer Doe	Deer Buck	Total Deer		Elk Cow	Elk Bull	Total Elk	Big Game Killed
2001	Jan-Feb, Aug, Nov-Dec	5	176-276	40	19	59		20	1	21	80
extra- polated 2001*	5/12 year			(96)	(46)	(142)		(48)	(2)	(50)	(192)
2003	Jan-Mar; Sep- Dec	7	176-281	188	70	258		11	4	15	273
extra- polated 2003*	7/12 year			(324)	(121)	(445)		(19)	(7)	(26)	(471)
2005	Jan-May	5	176-242	133	50	195**		17	11	28	223
extra- polated 2005*	5/12 year			(319)	(120)	(329)		(41)	(27)	(68)	(397)

*Extrapolated numbers of road killed animals is based on the fraction of a year for which there were data. These estimated numbers are enclosed in ()

** The sex of 12 of the road killed deer were not determined; however these 12 deer are included in the total number of deer and total number of big game animals killed in 2005.

REFERENCES

- 1) "Deer-Vehicle Crash Countermeasure Toolbox: A Decision and Choice Resource" by Keith K. Knapp, June 2004 available online at <http://www.mrutc.org> and <http://www.deercrash.com> (Completed as part of the Deer-Vehicle Crash Information Clearinghouse Initiation Project for the Wisconsin Department of Transportation, SPR Project Number 0092-01-11, Report Number DVCIC – 02)
- 2) Current research: National Cooperative Highway Research Program - Active Project, Project 25-27: Evaluation of the Use and Effectiveness of Wildlife Crossings by John A Bissonette of Utah State University, Effective June 1, 2004 thru May 31, 2007 also available online at <http://www.deercrash.com>
- 3) "Identifying the Best Locations Along Highways to Provide Safe Crossing Opportunities for Wildlife" by Sarah A. Barnum, August 2003, Colorado Department of Transportation, Report No. CDOT-DTD-UCD-2003-9
- 4) "Effectiveness of Earthen Ramps in Reducing Big Game Highway Mortality in Utah" by John A. Bissonette and Mary Hammer, November 2000
- 5) "Mule Deer-Highway Mortality in Northeastern Utah: Causes, Patterns and a New Mitigative Technique" by Mark E. Lehnert, Laura Romin and John A. Bissonette, 1994
- 6) "Wildlife vehicle collisions in Utah: An analysis of wildlife road mortality hotspots, economic impacts, and implications for mitigation and management." M. S. Thesis, Utah State University, Logan. 201pp. Kassir, C. 2005